

BULLETIN OF MISCELLANEOUS INFORMATION No. 7 1929 ROYAL BOTANIC GARDENS, KEW

XXXV.—DISEASES OF LIMES AND SUGAR-CANE IN THE WEST INDIES.

The following tour notes by Mr. S. F. Ashby, Mycologist of the Imperial Bureau of Mycology, are of interest in that they show how an enquiry into what was believed by the local planters to be a severe crisis in the lime industry of some of the West Indian Islands, owing to disease, led to the discovery of a gradual and largely unsuspected accumulation of disease in another important crop—sugar-cane, while allaying the alarm caused by the more obvious troubles in the lime plantations. The latter were found to be the result of exceptional climatic conditions during the past few years and not to be such as need cause permanent uneasiness. The sugar-cane disease, on the other hand, is one which, unless promptly combated, will almost inevitably result in very serious injury to this crop, though its progress is so subtle that its potentialities for harm might not have been realized until too late.

Fortunately the West Indies are exceptionally favourably situated to prevent a disastrous outbreak of the gumming disease, as they possess a wide range of otherwise desirable cane varieties that have the property of resisting the invasion of this parasite, and the prompt acceptance by planters of the advice to abandon the cultivation of the susceptible kind is a very hopeful sign that the consequences of this unfortunate development may not be serious.

E. J. BUTLER.

The visit, which extended from the middle of January to the end of March, 1929, was made at the request of the Commissioner of Agriculture for the West Indies, and was mainly for the purpose of investigating the so-called red root disease of lime cultivations in Dominica. The Commissioner had asked also for a visit to Antigua to determine if the withertip disease of limes was present in that island, and a visit to St. Lucia to examine the agricultural situation and the injury, if any, caused by plant diseases. On the outward voyage opportunity was afforded for discussing my tour with the Principal of the Imperial College of Tropical Agriculture who was attending the Inter-Island Conference at Barbados. During the three days available at Trinidad close touch was maintained with the Commissioner, who had returned from a visit to the Windward and Leeward Islands. The College was visited and interviews held with Professor Briton-Jones and other members of the staff, and

with Dr. Wardlaw, Mycologist of the Banana Research Scheme ; the low temperature plant, nearing completion, was inspected. Dr. Mason and Dr. Harland at the Cotton Research Station kindly showed me their cotton plots. The Director of Agriculture was good enough to show me the citrus varieties and crosses at the Experiment Station, St. Clair, and I spent a day with Mr. Stell, the Government Mycologist, inspecting the two areas in which witch broom disease of cacao had been discovered in 1928, and in seeing systematic control work in progress.

In the course of the voyage to Antigua I interviewed the Acting Director of Agriculture, Barbados, and met the Geneticist and Entomologist, and, at Mr. Skeete's request, inspected some young Java seedling cane plants which had been recently introduced and found them to be apparently free from disease. At St. Lucia, Dominica and Montserrat I was met by the Agricultural Superintendents of those islands. During the three days spent in Antigua, lime cultivations, maintained and abandoned, were inspected but no signs of withertip (caused by the fungus *Gloeosporium limetticolum* Claus.) were detected. It is believed that Antigua is free from this disease, so that the regulations prohibiting introduction of lime plants and fruits should be retained. At the request of the Superintendent of Agriculture for the Leeward Islands, sugar-cane plants at two estates in Antigua were inspected and symptoms of gumming disease (*Bacterium vascularum* G. Smith) were found on the widely cultivated seedling Ba 11569.

Some twenty-three days were spent in Dominica investigating the so-called red root disease of limes. The dying out of the trees had begun to be noticeable on some plantations in the coastal area towards the end of 1926, becoming gradually more widespread and more intense during the early months of 1927. The failure appears to have been at its height during that year but continued during 1928 and up to the time of my visit. The intervening storm of September, 1928, introduced a complicating factor into the situation. Losses due to the death of the trees had been serious at a few of the plantations on the Leeward Coast where production had continued to be economic in spite of the presence of withertip. Professor Briton-Jones spent some ten days investigating the disease in July, 1927 (Annual Report of the Agricultural Department, 1927-28, pp. 3-11). He recorded the failure as a complex effect due to a sum of contributing factors, among which he mentioned the storm of 1926 and the protracted wet period following it. He noted the frequent presence of *Sphaerostilbe repens* B. and Br. in the dead roots, but did not regard it as an important factor in the causation of the disease. My observations were restricted to cultivations on the Leeward and South Coastal areas where crop production was still economic.

No actively parasitic fungus was detected on the roots or other parts of lime trees dead, dying, or affected by the disease. The

fungi found—*Sphaerostilbe repens* B. and Br., *Fusarium* sp., *Phomopsis* sp., *Botryodiplodia theobromae* Pat., &c.—must be regarded as saprophytes or weak to very weak parasites on roots or aerial parts of trees dead, dying, or lowered in vitality by other causes. There is no reason to think that any of the fungi found are new to the island and it is very probable that all have been present since the cultivation of limes was begun.

The dominant cause of the dying out of seedling lime trees during the last two years appeared to be:—

- (1) The storm of July, 1926, which caused internal and external injury by strain and twisting of the shallow-rooted seedling lime trees over a considerable area, but especially in the more exposed situations.
- (2) The protracted wet weather following the storm which extended through 1927, no dry season occurring during that year.

The lack of opportunity for the soil to dry out doubtless resulted in deficient aeration and a diseased condition of the roots, promoting probable entrance into, and extension within, the tissues injured by the storm, of some weakly parasitic soil-inhabiting fungi.

Sphaerostilbe repens (the conspicuous rhizomorphs of this fungus in the cortex and on the wood of roots gave rise to the common name of the disease) was of very frequent occurrence on trees in differing situations (hillsides and flats) and on soils varying in character. This fungus was found on lime roots in Dominica by South in 1911 (Annual Report of the Agricultural Department, 1912-13, p. 9), and mention was made of it in association with diseased lime roots on a number of occasions in Reports of the Department during the succeeding ten years. It has been recorded frequently in association with root disease of woody crop plants in the Eastern tropics, but inoculations of roots, made with pure cultures of the fungus, notably by Brooks* in Malaya on Hevea rubber plants in pots and in the field, and very recently by Small and Bertus† in Ceylon on wounded and unwounded sound roots of mature trees of dadaps (*Erythrina lithosperma*), Hevea rubber and tea and on seedlings of Hevea rubber and cacao, have yielded entirely negative results.

Further injury in Dominica has been done by the storm of September, 1928, and a number of trees will doubtless die in consequence during the present year, but as the dry season has been normal the severity of the disease is not likely to approach that of 1927. The isolation of spots where trees had died or were dying, by trenches, based on the assumption that an actively parasitic fungus was present capable of spreading through the soil or from the roots of affected to those of adjacent trees, has been given up as the results were negative. The exposure and removal of dead or dying

*Brooks, F. T. Some Diseases of Plantation Rubber in Malaya. *Ann. Appl. Biol.*, ii, No. 4, p. 217, 1916.

†Small, W. & Bertus, L. S. On the Parasitism of *Sphaerostilbe repens* B. & Br. *Ann. Royal Bot. Gard., Peradeniya*, xi, pt. 2, p. 189, 1929.

main lateral roots where trees are showing early signs of failure in single limbs is recommended for trial, as some planters claim beneficial results from such treatment, although others have had no success.

I am in agreement with Professor Briton-Jones that the budding (or grafting) of lime on sour-orange stocks (other stocks are also under trial) is the only effective remedy for avoiding immediate and deferred losses due primarily to storms. This work is being actively undertaken by the Agricultural Department and on two of the leading estates where nurseries have been established. It is very gratifying to note that Mr. Green of Roseau, the owner of Sherwood and Green Hill Estates where the cultivation of seedling limes had become uneconomic owing to withertip, has planted up on those properties the immune varieties, Tahiti, Bear's Seedless and Woglum's lime, and certain crosses with the common lime, all having been made available to him by the Agricultural Department. As he is vitally interested in overcoming withertip, the kinds mentioned will receive excellent opportunity to show their worth, and definite data in regard to the quality of the fruit may be expected this year or in 1930.

The losses caused by withertip and the so-called red root disease have fortunately been compensated temporarily by the phenomenal market value of lime oil and the consequent increased local prices for ripe limes and fresh juice. This situation should enable the estates to face the expense of planting budded or grafted limes with a view to insuring the future against storm damage.

A lecture on the root disease of limes was given before the Agricultural and Commercial Society before leaving the Island.

Gumming disease was detected on three old varieties of sugar-cane at a lime estate. Two of the varieties were Purple Transparent and Caledonia Queen (Cavengerie). It was recommended that good resistant seedling canes of recent origin (B.H.10(12), S.C.12/4, &c.), be obtained and grown by the Department for distribution.

At the urgent request of the Government of the Leeward Islands, supported by the Commissioner, I visited Antigua again early in March for three days and inspected sugar-cane on a number of estates. The Federal Department of Agriculture in cooperation with the Island Department had, during my absence in Dominica, made a survey of the distribution of gumming disease on all cultivated varieties of cane and obtained from planters a census of the acreage of each variety under cultivation. It was found that Ba 11569 was practically fully infected throughout the Island and it was doubtful if a single stool was free from it. Most of the other varieties showed slight or very slight leaf infection when growing adjacent to, or in mixed plantings with, Ba 11569. The infection on mature Ba 11569 was largely restricted to the leaves and leaf-sheaths, stalk infections appearing to be occasional and light, and no trouble due to gum in the juice had been recognised in the crop of 1928 at the Central

Factories. Ba 11569 had been found to be a valuable cane for late planting and late supplying and was tending to become rapidly one of the dominant varieties under cultivation. A lecture was given to a very representative meeting of planters at the Government Laboratory before I left; at the meeting it was decided unanimously to stop planting the variety Ba 11569. As further observations were very desirable in regard to the behaviour of the disease, both on the mature crop and on the growing plants and ratoons destined for the crop of 1930, as well as experimental work, it was recommended that an officer, already with some experience of the disease, be appointed temporarily in the Federal Department as a Special Assistant for sugar-cane disease to undertake that work.

Montserrat was not visited as the available shipping connections would have involved a long stay which did not seem to be justified. I was able, however, in going to Antigua on both occasions, to meet the Agricultural Superintendent and a number of planters of Montserrat. Specimens of diseased lime plants submitted for examination were free from withertip and it is believed that the disease is not present in that Island. The Regulations prohibit introduction of all kinds of citrus plants and fruits. Owing to the hurricane in September, 1928, fresh fruit is scarce and cases of pellagra have occurred which medical opinion attributes to this shortage, especially of citrus fruits. Withertip of limes cannot be introduced on orange and grapefruit, as these kinds are immune from the disease. Antigua permits entrance of oranges and grapefruit as fresh fruits, and withertip does not occur there. It was recommended, therefore, that the Regulations excluding oranges and grapefruit be withdrawn, while retaining those prohibiting entry of lime plants and fruits.

During the nine days spent in St. Lucia I stayed, by kind invitation, at Government House, when not travelling, so that ample opportunity was afforded for discussing with His Honour the Administrator all matters concerning agriculture which came under my notice. Two crop seasons have now been experienced in St. Lucia under withertip conditions. In the wetter interior districts, the crop has been severely reduced or lost as in Dominica. In the northern districts, near the coast, where the rainfall is moderate, the crop has not been appreciably affected by the disease and the setting is again very promising. In the Soufrière valley the two last crops have been reduced to a quarter to a third but may continue to be economic on some plantations. In plantations on sunny hillsides slight or no effect has resulted from the disease. The nurseries for citrus, coffee, avocado, orange, papaw, pineapple, &c., at the Government property—Union—were inspected and the promising progress of nine months' work noted.

Marsh seedless and Duncan grapefruit plants on sour-orange stock obtained from Florida through the instrumentality of Professor Clark Powell were inspected at Union and at a number of estates. Most of them have grown and appear to be free from diseases.

Coconuts, extensively planted on the Windward coast, appear to be in good health. No cases of red ring disease, caused by the nematode *Aphelenchus cocophilus* Cobb, were seen and none has been suspected. This disease is present in St. Vincent and on no account should seed coconuts be brought from that Island into St. Lucia, as it is probable that the nematode is carried in the husk.

Sugar-cane was inspected at a number of estates, but no signs of gumming disease were detected on Ba 11569 and other varieties under cultivation.

It was recommended that the Agricultural Superintendent go to Dominica to examine the work of the Department there on limes and, especially, to inspect and obtain the varieties immune against withertip.

In spite of the failure to establish a banana growing industry in St. Lucia, the planters are keenly interested in the prospects of obtaining a market in Canada for other fresh fruits, especially grapefruit, oranges and avocados, and probably mangoes and pineapples, and I was able to meet the Secretary of the Fruit Producers' Association and the agent in Castries, who acknowledged valuable help received from the Agricultural Superintendent. The Government is actively fostering this tendency by obtaining and raising budded and grafted stock of the best varieties at Union.

At Barbados, *en route* for Trinidad, I made a tour of inspection of sugar-cane cultivations in company with the Acting Director of Agriculture, but saw no signs of gumming disease on Ba 11569 and other varieties in that Island.

During the two days available at Trinidad before leaving for England I visited the Usine St. Madeleine sugar estates and, in company with the Manager and the Agricultural Adviser, inspected the field plantings of Ba 11569 and other kinds, and the variety plots but did not find evidence of gumming disease.

The Curator and Botanist of the Department of Agriculture, who had just returned from a tour of inspection of the citrus industry in Florida and Porto Rico, kindly showed me the lime varieties and the crosses which he was raising at the Experiment Station, St. Clair.

Before leaving Trinidad I submitted to the Commissioner a preliminary report on my tour of the Islands.

It is a great pleasure to acknowledge the generous facilities offered by, and the kind hospitality of, their Honours the Administrators of Dominica and St. Lucia, the two Islands in which I made the longest stay, and the great helpfulness of the officers of the Agricultural Departments in all the Islands. To the Commissioner of Agriculture I am much indebted for valuable information regarding the agricultural conditions in the various Islands and for the trouble he took in arranging my itineraries.

XXXVI.—NEW FERNS FROM TROPICAL AMERICA
AND THE WEST INDIES. KAREL DOMIN.

When studying the Pteridophyta which I collected in Dominica I was in many cases obliged to make a critical revision of the forms and allied species from other islands of the West Indies as well as from Tropical America. In the following short contribution I give the descriptions of some new forms the type specimens of which are in the Herbarium of the Royal Botanic Gardens at Kew.

Hemitelia abitaguensis Domin, sp. nov. ; *H. Pittieri* Maxon, Costae Ricae incola, proxime accedit et notis nonnullis speciei nostrae respondet, sed differt praeter alia pinnis latioribus, segmentis apice distincte acute serrulatis, apice acutis.

Robusta, habitu *H. spectabili* var. *longipinnae* Dom. simillima, nisi profundius pinnatipartita ; secundum collectorem " filix 6-pedalis, stipite 2-3-pedali incluso, imparipinnata, pinnis 11-jugis " ; *rhachis* robusta, brunneo-straminea, quadrangularis, insuper rimoso-caniculata, glabrescens (deciduo-furfuracea), parte superiore graciliore subacute quadrangulari glaberrima ; *pinnae* sessiles vel subsessiles, oppositae, in specimine nostro tantum penultimae alternantes, mediae, ut videtur, circiter 34-35 cm. longae et 6.5-7 cm. latae, late lineari-oblongae, basin versus haud angustatae, apice acutatae et acumine tenui serrato terminatae, praeter apicem brevem lobatum circa 26-jugae, ad duas trientes pinnatipartitae, rigidiusculae, supra obscure virides et in sicco subnitentes, subtus pallidiores, opacae, glaberrimae ; *costae costulaeque* in pagina utraque prominulae, omnino epaleaceae ; *segmenta* subcontigua, arcuata, late falcato-lineari-oblonga, ad sinum circiter 10-12 mm. lata, apice obliquo obtusa sed imo apice acuta, latere exteriori arcuata interiore recta, margine distincte sed minute serrulata ; *venatio* utrinque sed praesertim in pagina superiore acute prominula ; costula utrinque venis circiter 12 a basi ipsa bifidis vel saepissime duplo bifurcatis instructa ; venae infimae, e basi costulae egredientes, liberae, haud anastomosantes sed arcuatae et in sinum progredientes ; *sori* uniseriati, minusculi, exacte inter marginem et costulam intermediarii ; sororum series segmentorum apicem haud attingentes, sed inferne arcuato-conjunctae, a costa attamen 3-4 mm. distantes ; *indusia* membranacea, in circuitu semicircularia, praeter marginem pallidum fusco-brunnea, biloba ; *receptaculum* cylindrico-globosum, sub lente setuloso-granulosum.

Habitat in Andibus Ecuadorensibus in monte Abitagua, October 1857, *Spruce* 5364.

Hemitelia quitensis Domin, sp. nov. ; species in subgenere *Cnemidaria* notabilis et cum nulla alia confundenda. Praeter pinnarum formam areolis depressis et praesertim costis paleaceis sorisque costulis approximatis et costas fere tangentibus insignis.

Caudex et *stipes* desunt, sed *stipes* e collectore quadripedalis spinosa ; *rhachis* robusta subteres, furfuraceo-tomentella sed ob

indumentum detersile pro parte glabrescens; frons pinnata, sed in specimine nostro tantum pars verisimiliter media quadrijuga adest; *pinnae* oppositae sessiles, 7–8 cm. invicem distantes, subrigidiusculae, glaberrimae, late lingulato-lineari-oblongae, basi rotundatae, apice parum angustatae et serrato-acuminatae, multi-jugae, jugis (supremis coalitis additis) saltem 40, circiter 33 cm. longae et 5.5–6 cm. latae, infra medium pinnatipartitae, parte quinta superiore tantum crenato-lobulatae, eodem colore atque eae *H. spectabilis*; *costa* in pagina superiore paleis sat numerosis magnis latisque, ovatis vel ovato-lanceolatis, margine suberosis, distincte acuminatis, glabris, circiter 15 mm. longis et basi usque 5 mm. latis, instructa, sed insuper epaleacea, glabra; *costulae* infra paleis similibus sed multo minoribus hinc inde vestitae, plerumque epaleaceae; *pinnulae* alternantes, mediae circiter 25 mm. longae et ad sinum circiter 8 mm. latae, contiguae, sinubus angustissimis separatae; *segmenta* oblongo-obovata, parum falcata, obtusissima, apice conspicue serrato-dentata, lateribus integra; *venatio* tenuis sed praecipue in pagina superiore acute prominula; venae utrinque 12–13, basi bifurcatae, ramo superiore recto, inferiore arcuato; venulae infimae anastomosantes et areolas costales humillimas, tantum circiter 1 mm. altas efformantes; *sori* mediocres vel minusculi, densi, uniseriati, ad venulas furcatas inserti; sororum series a margine remotae et costulae approximatae, ad costam arcuatim connectae et costam fere attingentes.

Habitat in Ecuador in Andibus Quitensibus ad fl. Peripa prope Mig, ubi hanc plantam *P. Sodiro* anno 1875 collegit et nomine *H. grandifoliae* designavit.

***Hemitelia roraimensis* Domin**, sp. nov.; species notabilis et facile distinguenda. *H. subincisa* jam pinnis basi cuneatis, venatione et sororum dispositione discrepat. Species nostra cum *H. mexicana*, *H. lucida* et *H. guatemalensi* comparanda est (cf. Maxon), sed ab omnibus sat superque distincta. *H. spectabilis* venulis numerosis furcatis necnon sororum dispositione primo aspectu separanda est.

Caudex et *stipes* desunt; *frons* late triangulari-ovata, pinnata, 10-juga, 65 cm. longa; *rhachis* glabra, epaleacea, subquadrangularis, lateribus profunde rimosa, brunnescens, insuper gracilior; *pinnae* oppositae, rarius suboppositae, lineari-lanceolatae, sensim acuminatae, basi latissimae et truncatae, lateribus rectis, lobulo ultimo inferiore paulum auriculato-provecto, omnes sessiles et colore cum iis *H. spectabilis* congruentes, subrigidiusculae, glaberrimae; *pinnae infimae* (longissimae) circiter 22 cm. longae et 3 cm. latae uti superiores (supremis exceptis) tantum pinnato-lobulatae; lobuli maximi quadrantem usque trientem pinnae dimidii attingentes, longitudine sua conspicue latiores (basi circiter 7 mm. latae sed tantum 4–5 mm. longae), inaequilaterales (falcatae), apice obtusissimae sed ad lateris superioris apicem subacutae, integrae vel subintegrae, marginibus minute revolutae; *pinnae superiores* sensim paulo diminuentes et

minus profunde lobatae; pinnae *supremae* circiter 13 cm. longae, tantum lobatae; segmentum terminale ovato-lanceolatum, acuminatum, 18 cm. longum et basi 8 cm. latum, inferne pinnatipartitum (segmentis obtusissimis), dein lobatum et crenatum; *costa* penninervia, venis (costulis) utrinque circiter 23-25 instructa; *costulae* rectae, tantum apice incurvae, utrinque venas circiter 4 semper simplices emittentes; *venae* infimae anastomosantes et areolas costales triangulares sat altas efformantes; *venulae* ipsae ad sinum egredientes ibique haud inter se sed plerumque cum venis superpositis conjunctae; *sori* minusculi haud numerosi, ad venas instructi, uniseriati; series sororum inter costulam et marginem intermedia vel margini aliquantum propius accedens, in lobulo arcuato-contigua sed etiam versus costam connexa sed a costa valde (circiter 5 mm.) remota.

Habitat in British Guiana: Roraima, 1863/64, C. F. Appun 1127, a cl. J. G. Baker pro *H. subincisa* Kze. declarata ("Type specimen of Martius Flora Brasiliensis").

Praeter formam supra descriptam, specimina sequentia ad speciem nostram referenda vidi:

(1) British Guiana: Kwating Creek, 1863/67, C. F. Appun 1035. Forma ut videtur multo robustior, *pinnis* profunde pinnatilobis, *venis* lateralibus plus numerosis (circiter 6), infimis supra areolam costalem triangularem duas areolas angustas rectangulares efformantibus.

(2) Roraima Range, 3500 ft. alt., Mount Roraima Expedition, 1898, F. V. McConnell and J. J. Quelch 620.

A typo recedens tantum *statura* multo robustiore *lobis* parum incisus et propterea *pinnis* tantum obtuse serrato-lobulatis.

***Alsophila submarginalis* Domin**, sp. nov.; species ab *A. praecincta*, quacum erat confusa, toto caelo abhorrens et jam pinnis profunde pinnatisectis facillime dignoscenda. Sororum seriebus submarginalibus, pinnis levissime subcordatis notisque aliis paucis (praesertim venatione) cum *A. praecincta* comparanda, sed praeter pinnarum divisionem pinnulis late lineari-oblongis, segmentis fere rectis, obtusissimis, perlatis, contiguis, facile separanda.

Caudex et *stipites* desunt; *frons* bipinnata, rigidiuscula, minus discolor quam in *A. praecincta*; *rhachis* laevis, brunnescens; *pinnulae* densae, subcontiguae, sessiles, sed ob segmenta manifeste alternantia basi valde inaequales, truncatae vel leviter subcordatae, majores in specimine nostro 10-12 cm. longae et 2.5-2.75 cm. latae, late oblongo-lineares, apice triangulari brevius acuminatae, praeter apicem pinnatilobum circiter 13-jugae, profunde pinnatisectae, basi articulatae; *costae* et *costulae* hinc inde sed praesertim subtus paleolis parvulis albidis scariosis, ovatis usque lanceolatis et acuminatis instructae sed praeterea omnino glabrae; *segmenta* densa, subcontigua vel contigua et propterea pinnulas quasi continuas efformantia, oblonga, valde lata, obtusissima, circiter 13 mm. longa et 6 mm. lata, fere recta, toto margine distanter minute

subserrulato-denticulata; venatio tenuiter prominula sed vix colorata; *venae* pinnularum sterilium utrinque circiter 6 (5-7), plurimae paulo infra medium bifurcatae, nonnullae interdum trifurcatae; *venulae* pinnularum fertilium plerumque simplices; *sori* utroque latere 3-5, submarginales, infimi arcte ad sinum positi.

Habitat in Brasilia: *Martii* Herbar. Florae Brasil. 391 ("A. *praecincta* Kunze").

***Alsophila dryopteridoides* Domin**, sp. nov.; species notis nonnullis in affinitatem *A. praecinctae* spectans, sed ab hac jam soris intermediis (nec marginalibus) diversa. *A. leucolepis* paleis et pinnulis profundius incisus facile dignoscitur.

Caudex et *stipites* desunt; *frons* bipinnata, pinnulis pinnatifidis; *rhachis communis* robusta, subteres, laevis, pallida, obtuse sulcata, inermis; *pinnae* sessiles alternae, elongato-lanceolatae, acuminatae, in specimine nostro pinna unica fere semimetralis 18 cm. lata, 18-juga, apice pinnatifido dein lobato instructa; *rhachis specialis* stramineo-brunnescens, pallida, subangulata, glabra laevisque; *pinnulae* sessiles, alternae, lineari-lanceolatae, sensim longe acuminatae, basi aliquantum inaequali cuneato-truncatae, longissimae 9 cm. longae et basi qua latissime patent 15-16 mm. latae, parum discolores et utrinque opacae (nec nitidae), rigidiusculae sed haud coriaceae, fere ad medium (tantum ima basi profundius) pectinato-pinnatifidae, dein pinnatilobae et acumine tenui sat longo tantum crenulatae, margine revolutae, supra glabrae, subtus ad costam et costulas *paleolis* albidulis scariosis parvulis vesiciformibus sat crebre obsitae et in pagina ipsa minutissime punctulatae; *segmenta* (lobique) recta, divaricata, lineari-oblongo-triangularia, obtusissima et ob marginem revolutum quasi subintegra, sed re vera minute distanter crenulata; *venae* pinnularum fertilium utroque latere tantum circiter 5, rectae, aliae imo apice furcatae, aliae simplices soriferae; *sori* inter marginem et costulam fere medii, sed ob marginem revolutum aliquando margini quasi approximati, in utroque latere 4-5, mediocres, segmentorum apicem fere attingentes, infimi inter sinum et costam intermedii; receptacula globosa, echinata.

Habitat in Brasilia in sylvis antiquis ad Gongosoco provinciae Minas Geraes, *Gardner* 5331 (J. G. Baker ut *A. leucolepis* Mart.).

***Alsophila polyphlebia* Domin**, sp. nov.; *A. leucolepidi* affinis, sed ob paleas basales ignotas aliquantum dubia. Ab *A. leucolepide* differt colore, textura herbacea, segmentis majoribus planis divaricatis, paleolis majoribus ut videtur deficientibus, et praesertim venis plurifurcis, soris costulae approximatis et receptaculo longe crinito.

Rhachis communis sparse spinuloso-muricata; *frons* herbacea, supra fusco-viridis, subtus opaca (nec laete viridis); *pinnulae infimae* brevissime petiolulatae, usque 11 cm. longae et 1½ cm. latae, superiores subsessiles, oblongo-lineares, breviter acuminatae, ad

duas trientes fere ad rhachin pinnatisectae; *costa* supra adpresse striguloso-hirta, infra pilosula et tantum *paleolis* perraris bullatis parvis acuminatis albidulis instructa; *segmenta* fere ad rhachin pinnatisecta, fere angulo recto patentia, lineari-oblonga, grosse dentato-serrata, recta, obtusissima, praeter *costulam* minute puberulam et magis minusve paleolatam utrinque glabra; *venae* utroque latere circiter 6-9, supra basin trifurcatae vel in ramos 4 (5) divisae, rarissime hinc inde vena simplici interjecta; *sori* in utroque latere circiter 5-6, ad furcam primam vel superiorem insidentes, in vena infima saepe bini; sororum series costulae quam margini propius accedentes; *receptaculum* pilis longis densis hyalinis articulatis flexuosis crinitum.

Ilhios Brasiliae, *Moricand* (Baker in Mart. Fl. Bras. sub nomine *A. phaleratae* var. *alutaceae*).

Diplazium Bakerianum Domin, sp. nov.—*Asplenium Shepherdii* var. *costaricense* Bak. in Journ. Bot. xxv. 25 (1887), nec *Diplazium costaricense* C. Chr.

Excellit *fronde* elongato-oblonga, rigida, apice attenuato in pinnulas (*segmenta*) parvas elliptico-rhomboidales pinnatisecta et demum tantum acumine serrato caudata; frons tota distincte pinnata, circiter 14-20-juga; *pinnae* breviter sed distincte petiolulatae, e basi quam maxime inaequali anguste cuspidatae, i.e. sensim sensimque lineari-lanceolatae et tenuiter longe acuminatae, ima basi infra manifeste horizontaliter truncatae, sed latere superiore segmento distincto majusculo erecto rhomboidali instructae, praeterea tantum parte infima utrinque in lobos 1-2 pinnatifidae et insuper tantum crenatae et acumine subintegro terminatae; *sori* simplices lineares, recti vel obliqui, secundum pinnarum costam biseriati, sed praeterea etiam segmento basali superiore sorifero.

Habitat in Costa Rica, J. J. Cooper.

Dryopteris (Lastrea) Harcourtii Domin, sp. nov.; species habitu phegopteroideo tenerrimo haud singularis, sed characteribus, ut videtur, satis distincta, *D. Nockianae* (Jenm.) C. Chr., cujus specimen jamaicense a cl. Sherring anno 1886 collectum examinavi, forsan proxime affinis, sed differt paleis, statura robustiore, pinnis distantibus, segmentis obliquis et venis plurijugis. *D. oligocarpa* O. Ktze. notis nonnullis speciem nostram revocat, sed differt inter alia paleis minute pubescentibus, indumento, laciniis subrectis haud linearibus, venis 6-8-jugis, indusiis pubescentibus.

Rhizoma crassum, erectum, breve, caespitosum, radices rufo-tomentosas emittens, apice *paleis* fusciscentibus, latis, ovatis, acuminatis, glabris, lucidulis, circiter 5 mm. longis vestitum; *frondes* graciles, erectae, elongatae, usque plus quam 6 dm. longae, primo aspectu longe stipitatae, sed re vera stipite spurio (rhachi pinnae redactas minutas usque minutissimas gerente) instructae; *stipes* verus brevis, ima basi excepta pallidus (stramineus), obtuse compresso-quadrangulus et antice bisulcatus, glabrescens (vel

minute puberulus) sed hinc inde paleis instructus; *rhachis* gracillima, straminea, glabrescens (re vera dense sed minutissime glanduloso-puberula), antice bisulcata, postice teres; *lamina* utrinque laete viridis, tenuiter membranacea, pellucida, praeter glandulas fere omnino glabra, pinnis infimis minutis neglectis circiter 30–35 cm. longa et 11–13 cm. lata, lanceolato-elliptica vel lanceolato-oblonga, acuminata, basin versus gradatim sed breviuscule decrescens et sat abrupte in pinnas parvulas, porro minutissimas, valde distantes et basin versus alternantes abiens; *pinnae* diminutae frondis in specimine maximae utroque latere quinque, secus tractum 14 cm. longum dispositae, summae maximae 1 cm. longae, sed infimae ad auriculum pinnatifidum vix 1 mm. longum restrictae, in frondibus ceteris minoribus, frondis parte basali typo primo cl. C. Christensen bene respondentibus, tantum 2–3; pinnae omnes sessiles, plerumque alternae sed in fronde maxima omnes oppositae vel suboppositae, patentissimae, utroque latere numerosae (17–20) sed semper interstitiis liberis separatae, lineari-oblongae vel lanceolato-oblongae, acuminatae et saepe parte superiore plus minusve falcatae, aequilaterales, maximae circiter 6–7.5 cm. longae et circiter 13–14 mm. latae, fere ad costam ipsam pinnatisectae, summae in spicam lanceolatam, distincte acuminatam pinnatisectam, porro pinnatifidam desinentes; *segmenta* numerosa sed sinubus apertis angustis separata, linearia, 8–10 mm. longa, sed tantum circiter 2 mm. lata, obtusa, falcato-incurva, margine crenulata sed ob marginem saepe paulisper revolutum quasi integra, pellucide punctata, basalia haud producta, omnia insuper praeter *costam* minute breviter pilosulam glabra, subtus glabra (tantum sub lente ad costas minutissime adpresse pilosula), sed sub lente *glandulis* sessilibus globularibus aureis lucidis pulcherrime crebre dispersa; *venae* 8–12-jugae; *sori* parvi, e sporangiis haud numerosis glabris compositi, ad apicem venarum inferiorum circiter 4 inserti (itaque submarginales), juventute indusio ut videtur glabro instructi.

Habitat in sylvis antiquis insulae Dominicae haud procul ab oppido Roseau, 1926, *K. Domin.*

Pityrogramma subnivalis *Domin*, sp. nov.; species certe insignis, rhizomate prorepente, habitu singulari, rhachi pallida, pinnis brevibus erectis, pinnulis crasse coriaceis, marginibus quam maxime revolutis, subtus sulphureo-farinosus, sed stipitibus ad basin albo-furfuraceis, inter alia notabilis. Ad *P. Ornithopteris* (Klotzch) Dom. proxime accedit, sed ab hac jam rhizomate, frondibus perangustis, pinnis brevibus erectis, indumenti farinosi colore sat superque distat.

Perennis, *rhizomate* crasso, elongato, oblique prorepente et ad apicem valde incrassatum caespites densos efformante, *paleis* fuscis, nitidis, lanceolatis, tenuiter acuminatis (sed acuminibus saepe delapsis) dense vestito; *frondes* erectae, e rhizomate plurimae, circiter 4 dm. longae, longe stipitatae; *stipites* frondibus longiores, raro tantum frondes aequantes, e basi arcuata erecti, interdum

subflexuosi, sat robusti, rigidi, epaleacei vel tantum ima basi paleis rigidioribus fuscis (nec ferrugineis) instructi, ceterum glaberrimi, sed parte basali distincte albo-furfuracei, praeterea efarinosi vel interdum medio vel insuper sulphureo-farinosi, ad medium vel fere ad apicem dilute purpurei, opaci (nec lucidi), insuper interdum pallide gilvi; *frondes* angustae, lanceolato-lineares, e basi latissima sensim decrescentes, crasse coriaceae, rigidae, glabrae, bipinnatae; *pinnae* erectae, lanceolatae, sat numerosae, inferiores distantes, infimae circiter 5 cm. (usque 7 cm.), mediae circiter 3 cm. longae; *rhachis* semper pallida (e gilva pallide fuscescens), primo sulphureo-farinosa, postremo denudata; *pinnulae* divaricatae, subtus pulchre sulphureo-farinosae, sat densae, indivisae, lineares vel lanceolato-lineares, perangustae, mediae circiter 5–8 mm. longae et 1.5 mm. latae, obtusae, valde coriaceae et in siccitate ob nervos in pagina superiore valde impressos rugosae, marginibus valde revolutis paginam inferiorem saepe totam obtigentibus, infimae pinnae cujusque longiores, sequentes gradatim decrescentes, valde distantes et quasi pectinatae, pinna terminali semper longiore et plus minusve lobulata.

Colombia: Sierra Nevada, Sta. Marta, 1884, *Purdie* ("near the snow, which may account for its peculiarly curled and rigid appearance").

***Pityrogramma austroamericana* Domin**, sp. nov.; species distincta, notis nonnullis *P. caribaeae* Dom. revocans, sed ab hac jam pinnulis acutis diversa. *P. calomelanos* (Sw.) Link jam indumento albo, pinnulis pinnatifidis acuminatis, *P. chrysophylla* (L.) Link pinnulis obtusis facile dignoscitur.

Caespitosa, *rhizomate* abbreviato, crasso, *paleis* angustis, e basi latiore anguste lanceolatis, longe et tenuiter acuminatis, ferrugineo-brunnescentibus vel ex parte nigricantibus, subnitidis dense vestito; *stipites* plerumque graciles, atropurpurei vel atrofusci, nitidi, glabri, nisi ima basi paleis caducis haud copiosis instructi plerumque nudi, raro basi paulisper aureo-furfuracei, laminas circiter subaequantur vel iis breviores, raro longiores; *frondes* lanceolato-deltoideae usque fere deltoideae, tantum breviter acuminatae, apicem versus sensim decrescentes, bipinnatae, superne tantum pinnatae, pinnis pinnatifidis usque simplicibus circiter 13–23 cm. longae et basi 8–11 cm. latae; *rhachis communis* fusco-purpurea, *rhachides speciales* plerumque pallidae et semper opacae; *pinnae* breviter petiolulatae vel subsessiles, lanceolatae usque lineari-lanceolatae, acuminatae sed imo apice obtusiusculae, subcoriaceae, substrictae, infimae circiter 6 cm. longae et basi 2–2.5 cm. latae, inferiores et mediae plerumque divaricatae, superiores erecto-patentes, ad frondis medium paulo diminuentes sed porro in formam angustam et postremo in pinnas elongato-lineares, basi superiore lobulo acutiusculo auctas desinentes; *pinnulae* rectae, sat densae, sed semper inter se spatio libero separatae, angulo acuto (circiter 45°) patentes, lineari-lanceolatae, apicem versus

angustatae, acutae vel subacutae, ob margines breviter revolutos quasi integerrimae, inferiores circiter 1 cm. longae et medio vix 2 mm. latae, omnes indivisae, basales pinnae cujusque haud elongatae sed plerumque utroque latere basi lobulo uno acuto praeditae, ceterae basi superiore in angulum subacutum provectae, lateribus rectae, omnes subtus indumento aureo persistente pulchre farinosae.

Brasilia : Rio de Janeiro, 1878, *Miers* 51 ; Cubatai, Theresopolis, 1869, *Fritz Mueller* 253 ; St. Catherina, *Fritz Mueller* 15 ; sine loco speciali, *Gardner* 12. Bolivia : Prov. Larecaja ; Challapampa, ad rivum in scopulosis, 2550-2700 m., 1860, *G. Mandon* 1549 bis ; Yungas, *A. Miguel Bang* 244. Paraguay : *E. Hassler* 1397.

XXXVII.—A NEW *MICHELIA* FROM THE BORDERS OF TIBET AND ASSAM. J. E. DANDY.

The new species of *Michelia* described below was collected by Captain F. Kingdon Ward during 1928 in the region of the Mishmi Hills, on the borders of south-eastern Tibet and the Lakhimpur District of Assam. His material consists of sterile branches accompanied by flowers which were picked up from the ground. In affinity the plant comes nearest to *M. doltsopa* Buch.-Ham. (including *M. excelsa* (Wall.) Bl. and *M. manipurensis* Watt)*, a widespread species which was met with in the not far distant Seinghku valley by Ward himself (n. 7629) in 1926. From *M. doltsopa* the new species differs chiefly in the indumentum of the stipules, spathoid bracts, and peduncles being greyish instead of rufous or tawny, and in the lamina of the leaves being narrower in shape and lacking the rufous or tawny indumentum of the lower surface which is so characteristic of the earlier known species.

***Michelia Wardii* Dandy, sp. nov.** [*Magnoliaceae-Magnolieae*] ; ex affinitate *M. doltsopae* Buch.-Ham. sed indumento griseo et foliorum lamina forma angustiore inter alia differt.

Arbor magna ; indumentum griseum ; ramuli glabri vel juniores ad nodos pubescentes. *Foliorum* lamina oblanceolata vel anguste oblonga vel anguste elliptico-oblonga, basi attenuata in petiolum decurrens, apice acuminata vel interdum acuta, usque ad c. 16 cm. longa et 4 cm. lata, chartacea, supra glabra, subtus glaucescens glabra vel in costa praesertim apicem versus parce appresso-pubescent, nervis lateralibus utrinsecus c. 9-14 subtus conspicuis ; petiolus gracilis, usque ad c. 1.5 cm. longus, glaber vel juvenilis basin versus appresso-pubescent, infra vel ad medium cicatrice stipulari notatus ; stipulae petioli parti inferiori adnatae, extus appresso-tomentosae vel - pubescentes. *Alabastrum* primo in bracteis spathoideis 3 extus dense sericeo-tomentosis deinceps deciduis inclusum ; pedunculus percrassus, c. 0.5-0.7 cm. longus,

*See Dandy in Journ. of Bot. lxxv : 277-279 (1927).

dense tomentosus. *Perianthii* tepala c. 9-12, subsimilia sed interiora minora, crenea, exteriora obovata- vel oblanceolato-oblonga c. 4.5-6.5 cm. longa extus ad basin pubescentia. *Stamina* c. 10-15 mm. longa; connectivum ultra antherae loculos in appendicem brevem brevissimamve acutam productum. *Gynaecium* saltem juvenile appresso-pubescent, stipite excluso subcylindricum; carpella numerosa; ovula c. 4.

Chibaon Delei valley, 28°10'N., 96°30'E., 2100-2400 m., 12 April 1928, *F. Kingdon Ward* 8060 (type in Herb. Kew).

Ward's field-notes run: "Michelia. A big tree, with large bole and spreading crown, rather ragged and semi-leafless. Flowers cream. In the mixed forest along the ridge. Flowers and fruit picked up. (Collected in the Seinghku valley 1926)." The last remark no doubt refers to his n. 7629, collected in the valley of the Seinghku at lat. 28°5'N. and long. 97°30'E. in 1926, and consisting of picked-up fruits which, from the indumentum of the peduncles, are not *M. Wardii* but *M. doltsopa*.

I am indebted to the Director of the Royal Botanic Gardens for the loan of the material concerned.

XXXVIII.—ON THE FLORA OF THE NEARER EAST: IV.* W. B. TURRILL.

***Delphinium acutilobum* Turrill**, sp. nov.; ab *D. thirkeano* Boiss. petali lobis mediis divaricatis elongato-triangularibus subacutis recedit.

Herba erecta, caulibus rigidis divaricatum ramosissimis inferne adpresse et breviter hirtis superne patule denseque velutinis glandulosis, ramulis ultimis unifloris plus minusve 2 cm. longis. *Folia* palmatim multipartita, adpresse puberula, laciniis linearibus vel oblanceolato-linearibus. *Bractee* saepissime integrae, lanceolatae, acutae, 2-3 mm. longae, hispidulae; bracteolae bracteis similes sed minores, a flore remotae. *Sepala* abaxialia lateralique oblonga, apice rotundata, 7 mm. longa, 2-3 mm. lata, 5-6 nervis gracilibus viridibus hispidulis instructa. *Sepalum* adaxiale saccatum extra hirsutulum. "*Petalum*" calcaratum, calcari apice clavato circinato-involuto, quinquelobatum, lobo superiore leviter retuso apice caeruleo, mediis divaricatis elongato-triangularibus subacutis, inferioribus membranaceis elongato-rotundatis, omnino 1.5 mm. longum, glabrum. *Stamina* inaequalia, filamentis obspathulatis leviter pubescentibus. *Carpellum* unicum, glabrum, vix 3 mm. longum, vix compressum. *Folliculus* subcompressus, oblongo-obovoideus, basi attenuatus, apice abrupte rostratus, 1.1 cm. longus, glaber, nitens; semina squamis longiusculis distinctis densissime obtectis.

N. Persia: Near Yam, Tabriz district, 21st Aug. 1927, *Gilliat-Smith* 2086.

*Continued from *K.B.* 1927, p. 14.

The extremely interesting group (Sect. *Consolida*, Tribus *Involuta*) to which this species belongs contains a very limited number of known species, all of them with an oriental distribution. All except one of these are now represented at Kew, and since the group is rather a critical one it will be well to compare our new species with each of those previously known.

D. aconiti L., the earliest described, is separated by its long slender fruits which, when mature, attain a length of 2.2 to 2.5 cm., including the beak. The indumentum of the upper parts of the stems and branches resembles that in our plant. The known distribution is limited to a small area on both sides of the Dardanelles (see *Kew Bull.* 1924, 306). *D. thirkeanum* Boiss. is separable chiefly by the shape of the so-called petal lobes, the intermediate ones being obtuse and approximately equal in length to the adaxial, which is two-lobed. The abaxial lobes are shorter and broader than in our plant. The indumentum of the stem is similar. This species is apparently limited to Asia Minor. *D. hohenackeri* Boiss. is distinguished by the reduced indumentum of the stem, this indeed being often glabrescent, and the more slender branching. The lobing of the petal shows some range of variation but is very like that in *D. thirkeanum*. The distribution is from Asia Minor (Cappadocia) eastwards to Transcaucasia and Persia, as far south-east as Ispahan. Its area thus includes that of our new species and indeed Bornmüller records it from "Urumia, ad Ser" in Verh. Zool.-Bot.-Ges. lx. 69 (1910). I have not seen the specimen named by Bornmüller, and it is possible it has been wrongly determined. *D. anthoroideum* Boiss. has an adpressed or sparse spreading indumentum. The lobing of the petal is apparently not quite the same in all specimens referred to this species by Huth in Engl. Bot. Jahrb. xx. 366 (1895) and often resembles that in our species. It is distributed from Asia Minor and Armenia to Syria and Iraq. *D. saccatum* Huth is distinguished from our species and all other species of this group by the petal spur not being circinate. It is known only from Mardin, near Richemil, in Kurdistan. *D. teheranicum* Boiss. from near Teheran in Persia has the petal minutely crenulate at the apex, not lobed. Its affinity with the other members of the *Involuta* is doubtful.

***Dianthus tenuicaulis* Turrill, sp. nov.;** a *D. androsaceo* Hayek caulibus elongatis tenuibus distinguitur; a *D. pinifolio* S. et S. calycibus minoribus squamis brevioribus recedit.

Planta caespitosa, partibus inferioribus suffrutescentibus. *Caules* erecti, graciles, usque ad 3 dm. alti, 0.75-1.5 mm. diametro, simplices, glabri. *Folia* anguste linearia, apicem versus gradatim attenuata, 1.6 cm. longa, 1 mm. lata, rigida vel subrigida, margine costaque serrulata, trinervia, nervis lateralibus obscuris. *Capitula* 1-4-flora, squamis involucri et calycinis circiter 8 oblongo-obovatis in aristam usque ad 3.5 mm. longam calyce brevioribus subito attenuatis stramineis plus minusve atropurpureo-suffusis. *Calyx* cylindricus, 1 cm. longus, 2 mm. diametro, atropurpureus in parte

superiore praecipue, dentibus elongato-triangularibus acuminatis 4 mm. longis instructus. *Petala* 1.6 cm. longa, purpurea, lamina 0.7 cm. longa basi gradatim cuneata apicem versus dentibus 4 grossis (2 lateralibus, 2 apicalibus) instructa. *Filamenta* 1.2 cm. longa; antherae 1.5 mm. longae. *Capsula* non vidi.

Bulgaria: south-central Rodopes, Daridere district, towards Boju, circiter 800 m., 17th July 1926, growing in clefts of metamorphic rocks, *Turrill* 1383.

***Silene delectabilis* Turrill**, sp. nov.; a *S. argaea* Fisch. et Mey. (in Ann. Sci. Nat. 1854, 36) foliis latioribus calycibus densissime glanduloso-pubescentibus distincta.

Planta perennis, compacta, nana, florifera; rami dense caespitosi, breves, floribus inclusis 4–6 cm. longi, foliacei, saepissime uniflori. *Folia* linearia, vel lineari-lanceolata, ad apicem acutum vel subacutum angustata, circiter 1 cm. longa, 1–2 mm. lata, plana vel leviter triangulari-subulata, margine ciliata (interdum densissime), pagina superiore dense tomentoso-puberula, inferiore glabra vel subglabra. *Calyx* anguste cylindrico-clavatus, 3 cm. longus, purpureo-ruber, glanduloso-pubescent, venosus, dentibus oblongis obtusis 3 mm. longis vix 2 mm. latis, fructiferus leviter subinflatus. *Petala* breviter bilobata, 1.4 cm. longa, 4 mm. lata, intense purpureo-rubra, coronae laciniis vix 0.75 mm. longis, oblique retusis, laminae basi sinu rotundato. *Ovarium* oblongum, 4 mm. altum, 1.5 mm. diametro. *Capsula* ovoideo-oblonga, 5 mm. alta, 5 mm. diametro, carpophoro 2.6 cm. longo. *Semina* tuberculato-reticulata, pallide brunnea.

N. Persia: near the top of Mishou Dagh, in cracks in the rocks, with very showy deep pink-purple flowers, 19th July 1928, *Gilliat-Smith* 2359.

This species is evidently a very attractive plant in the living state. It belongs to the section *Auriculatae* as defined by Boissier [Flora Orientalis i, 572 (1867)]. The name of the section is not very appropriate, since some of the species, including that now described, have petals no more auriculate than those of the next section, *Inflatae*, in Boissier's arrangement. The species described above has been placed near *S. argaea* Fisch. et Mey., which is known from Mt. Argaeus in Cappadocia and is, like ours, a mountain plant flowering in the summer. The leaves in the aggregate are much broader, the calyx is more densely glandular-pubescent, and the carpophore is longer in the Persian plant than in *S. argaea*.

***Minuartia acuminata* Turrill**, sp. nov.; a *M. dianthifolia* (Boiss.) Hand.-Mazz. habitu dense caespitosa, foliis caulinis acutioribus, sepalis acuminatis recedit.

Herba perennis, dense caespitosa, caulibus numerosis erectis ad 1.5 dm. altis subquadrangularibus inferne glabris superne glanduloso-hirtis. *Folia* basalia lanceolato-linearia, acuta, 1.3 cm. longa, 1.5 cm. lata, glabra, rigida, in paribus basi 1 mm. longa vaginata

connatis ; caulina anguste lanceolato-linearia, acuta vel acuminata, 8-12 mm. longa, margine inferne praecipue plus minusve membranaceo-vaginata. *Inflorescentia* terminalis, 1-5-flora ; pedicelli usque ad 1 cm. longi, glanduloso-hirti. *Sepala* lanceolata, acuminata, 8 mm. longa, 1.5 mm. lata, margine membranacea, circiter 8-nervia, extra glanduloso-hirta. *Petala* oblongo-lanceolata, obtusa, 6 mm. longa, 2-2.5 mm. lata, alba, nervis gracilibus circiter 7 praedita. *Stamina* fere 5 mm. longa. *Ovarium* 2 mm. altum, 1.5 mm. diametro, glabrum, stylis glabris 3 mm. longis.

N. Persia : Mishou Dagh, 19th July 1928, *Gilliat-Smith* 2374.

This interesting and, for its genus, handsome plant is a distinct species linking in some respects the subsections *Dianthifoliae* and *Graminifoliae* of Mattfeld [Fedde Repert. Beih. xv. 130 (1922)]. It has the densely caespitose habit of the latter subsection, but the sepals are longer than the petals. There is a gradual transition from the lower cauline leaves to the bracts, the latter being shorter and with a broader membranaceous margin than the former. The stems are obscurely quadrangular.

***Linum mucronatum* Bertol. var. *eglandulosum* Turrill, var. nov.** ; a planta vulgare foliis basi utrinque haud glanduloso-unistipulatis.

N. Persia : near Tabriz, May 1926, *Gilliat-Smith* 1586.

The original description and the specimens in the Herbarium at Kew indicate that *L. mucronatum* Bertol. is usually provided with well-marked stipules in the form of sessile or almost sessile glands which are brownish-black in the dried condition. In the material from Tabriz supplied by Gilliat-Smith these glandular stipules are obsolete or represented by the merest vestiges. Boissier [Flora Orientalis i. 855 (1867)] uses the name *L. orientale* as a new combination for *L. flavum* var. *orientale* L. and sinks *L. mucronatum* as a synonym. Since Bertoloni's name dates from 1842 this procedure is not in agreement with modern rules. It is also doubtful if all the specimens quoted by Boissier are conspecific.

***Astragalus* (§*Brachycalyx*) *constrictus* Turrill, sp. nov.** ; ab *A. eriostylo* Boiss. et Hausskn. ramis longioribus, calycis dentibus triangularibus, vexillo ovato-oblongo supra medium constricto, stylo glabro recedit.

Frutex ad 2.3 dm. altus, ramosus, spinosus. *Rami* ad 8 cm. longi, patentes, densissime albo-tomentosi, dense foliati. *Folia* circiter 2 cm. longa, foliolis oblongis 4-6-jugis approximatis 3-4 mm. longis 1 mm. latis apiculatis brevissime petiolulatis glabrescentibus, rhachide gracile inferne pubescente superne glabro deinde omnino glabro ; stipulae oblongo-triangulares. *Flores* in axillo quoque 2-3-aggregati ; bractae cymbiformes, 3.5 mm. longae, albo-membranaceae. *Calyx* 4.5 mm. longus, dense albo-pubescent, dentibus triangularibus acute apiculatis 1 mm. longis viridibus. *Corolla* lutea ; vexillum ovato-oblongum, supra medium constrictum, apice

rotundatum, 7 mm. longum, 3 mm. latum; alae 6.5 mm. longae, 1 mm. latae; carina 7 mm. longa, 1.5 mm. lata. *Ovarium* cylindricum, sessile, 2 mm. altum, vix 1 mm. diametro, dense tomentosum; stylus 4.5 mm. longus, glaber.

N. Persia: near Tabriz, 1927, *Gilliat-Smith* 1905a.

A. constrictus var. **tomentosus** *Turrill*, var. nov.; a var. typica foliis foliolisque valde tomentoso-hirsutis, spinis robustioribus rigidioribus, floribus leviter majoribus differt.

N. Persia, near Tabriz, 1927, *Gilliat-Smith* 1905b.

The species, *A. eriostylus* Boiss. et Hausskn. [in Boiss. Flor. Or. ii. 316 (1872)], with which *A. constrictus* is compared is known only from south-west Persia where it was collected, at 8000 feet altitude, "in montibus Kuh Sawers et Kuh Eschker," by Haussknecht. The affinity with our species is close, especially in the reduction of each inflorescence branch to a group of 2 or 3 axillary and sessile flowers.

Astragalus (§Ornithopodium) variistipula *Turrill*, sp. nov.; ab *A. shelkovnikovii* Grossheim e descriptione stipulis lanceolato-linearibus vel lanceolato-triangularibus, calyce leviter brevior, vexillo haud oblongo-lineare 1.3 cm. longo, legumine albo-hirto haud villosa differt.

Planta perennis, ad 2.2 dm. alta. *Caules* numerosi, tenues, erecti (?), a basi ramosi, adpresse griseo-canescens. *Folia* 2-5 cm. longa, utrinque adpresse griseo-canescens, foliolis 3-5-jugis anguste vel angustissime linearibus acutis usque ad 2.2 cm. longis vix 1 mm. latis; stipulae herbaceae, lanceolato-lineares, acutae, 8 mm. longae, 1 mm. latae, vel lanceolato-triangulares multo breviores latioresque. *Racemi* 5-12-flores, subaxi, foliis superantes vel aequantes; bractae subulatae, vix 2 mm. longae. *Calyx* tubulosus, adpresse albo- vel albo-nigroque-pubescent, 8 mm. longus, 2 mm. diametro, dentibus subulatis fere aequantibus 2 mm. longis. *Corolla* purpurea; vexillum 1.3 cm. longum, 6 mm. latum, obovatum sed apicem basimque versus attenuatum; alae 1.1 cm. longae, 2 mm. latae; carina 1.05 cm. longa, 2.5 mm. lata. *Ovarium* anguste cylindricum, 5 mm. longum, puberulum, stylo 6 mm. longo. *Legumen* pendulum, arcuatum, compresso-cylindricum, usque ad 3.5 cm. longum, adpresse albo-hirtum haud villosum, dorso sulcatum, inter semina leviter constrictum.

N. Persia: near Tabriz, flowers May 1927, fruits June 1927, *Gilliat-Smith* 1901.

This species is very near to *A. shelkovnikovii* as described by Grossheim in Beih. Bot. Centrbl. xlv. 2. 220 (1927), from near Drzhulfa and near Tabriz, and said also to occur in Russian Armenia. Unfortunately no authenticated specimen of Grossheim's species is available for comparison but, unless his description is misleading or the fluctuations are greater than one would expect in a species of this genus, our species will stand.

Trachyspermum ammi (L.) *Sprague*, comb. nov.

N. Persia : Tabriz, weed in a garden, July-Aug. 1927, *Gilliat-Smith* 2104.

This is the *Sison ammi* L. Sp. Pl. 252 (1753). It has been known by many names and a fairly full synonymy is given by Thellung in Hegi, Illustr. Flor. Mit.-Eur. v. 2. 1167 (1925) and l.c. 1140 (foot-note). A paper dealing with the history of this plant has been prepared for publication.

Pyrethrum Gilliatii *Turrill*, sp. nov. ; a *P. myriophyllo* C. A. Mey. foliis minoribus, involucri phyllis apice valde scariosis facile distinguitur.

Herba basi suffruticosa, adpressissime canescens. *Caules* erecti, simplices, usque ad 2.6 dm. alti sed interdum multo breviores, teretes, longitudinaliter striati, apice composite corymbosi, polyccephali. *Folia* ambitu anguste oblonga, 1.5-3.5 cm. longa, ad 7 mm. lata, in lacinulas minimas obovatas vel obovato-oblongas vel oblongas apice obtusas vel rotundatas utrinque dense canescentepubescentes uni- vel bipinnatisecta. *Capitula* late ovata, 7 mm. longa, 5 mm. diametro, involucri phyllis pubescentibus internis apice valde scariosis 5.5 mm. longis plus minusve laceris. *Flores* omnes tubulosi sed externi interdum foeminei, 6 mm. longi. *Achenia* immatura anguste cylindrica, 2.75 mm. longa, longitudinaliter striata, corona minima vix dentata.

N. Persia : hills to the south of Tabriz, 1927, *Gilliat-Smith* 1937. Earlier specimens of dwarfer habit, presumably from the same locality, and received as Nrs. 1688 and 1732, belong to this species.

If, conforming with Bentham and Hooker's *Genera Plantarum* and other works, the genus is sunk in *Chrysanthemum* the species is to be known as *C. Gilliatii* *Turrill*.

Cirsium yamense *Turrill*, sp. nov. ; a *C. arachnoideo* M.B. involucri phyllis subuncinato-recurvis simile capitulis minoribus differt.

Caulis 4 dm. longus, teres, superne glaber, inferne minime albo-arachnoideus. *Folia* ad 11.5 cm. longa, saepissime breviora, in lacinias lanceolatas vel triangulari-lanceolatas apice breviter spinosas pinnatifida, caulina amplexicaulia sed haud decurrentia, in pagina superiore strigosa, inferiore glaberrima. *Capitula* (in exemplare) 9-10, axillaria, haud aggregata, ovata, flosculis inclusis 2.5 cm. longa, 1.8 cm. diametro, leviter arachnoidea ; involucri phylla tenuiter lanceolata, apice subuncinato-recurva, omnia pallide viridia, externa 6-7 mm. longa, intimis 1.5 cm. longis. *Corolla* cylindrica, 1.3 cm. longa, 1.25 mm. diametro. *Pappi* setae albae, 1.3 cm. longae. *Achenia* immatura compresso-oblonga, leviter obliqua, 4 mm. alta, 1.7 mm. lata.

N. Persia : Tabriz district, Yam, 7th Aug. 1927, *Gilliat-Smith* 2001 ; 1928, *Gilliat-Smith* 2452.

Cirsium yamense var. **arachnoideum** *Turrill*, var. nov.

Folia in pagina inferiore arachnoidea.

N. Persia : Yam, Aug. 1928, *Gilliat-Smith* 2462.

Cousinia compacta *Turrill*, sp. nov. ; a *C. chrysacantha* Jaub. et Spach foliis radicalibus haud pinnatipartitis, involucri phyllorum mediorum spinis longioribus recedit.

Herba biennis compacta, adpresse albido-lanuginosa. *Caules* usque ad 2.6 dm. alti sed saepissime breviores, simplices vel ramosi, teretes. *Folia* radicalia ovata, breviter petiolata, 4.5 cm. longa et 3 cm. lata vel majora, margine spinosa sed haud vel vix lobata ; caulina valde decurrentia et spinosa, plus minusve lobata, longitudine variabilia. *Capitula* subsessilia vel pedunculo usque ad 1 cm. suffulta, late ovata, floşculis inclusis 2 cm. longa, spinis exclusis 1 cm. lata, 40-50-flora, involucri phylla 35-40, externa albo-lanata, basi late ovata, viridia, in spinam ad 1.6 cm. longam duram flavidam patentem abrupte contracta ; media late lanceolata 1 cm. longa, 3.5 mm. lata, viridia, apice breviter spinoso-attenuata ; interna 1.3 cm. longa, lineare-oblancoolata, membranacea ; receptaculi setae laevissimae vel ciliolatae. *Corolla* cylindrica, supra medium 1.5 mm. diametro, medio abrupte angustata, infra medium 0.5 mm. diametro, pallide purpurea. *Achenia* oblique compresso-oblonga, 3 mm. alta, 1.5 mm. lata, leviter rugosa, nigra.

N. Persia : near Tabriz, 25th June 1927, *Gilliat-Smith* 1956 (nomenclatural type) and 1755 (received 26th July 1926).

Pterotheca obovata *Boiss. et Noë* in Boiss Diagn II. iii. 98 (1856).

N. Persia : near Tabriz, *Gilliat-Smith* 1678 (6th July 1926), 1697, 2044. *Distrib.* E. Asia Minor, Caucasia, Armenia, Iraq, Persia, Baluchistan, Afghanistan.

The type of this species was collected 'in subalpinis Armeniae meridionalis circâ Ardana cl. Noë.' The description given by Boissier is an excellent one and agrees quite well with our specimens. Schischkin, in Grossheim A. et Schischkin B. *Plantae orientales exsiccatae* 150, accepting the genus *Lagoseris* makes a new combination, *L. marschalliana*, on the basis of *Crepinia marschalliana* Reichb. Fl. Germ. excurs. 269 (1830-32). Reichenbach's supposed species is, however, not described beyond the remark 'plantae tauricae, quae mihi propter achenia triformia.' I therefore consider the name is merely a *nomen nudum* and consequently reject the trivial. Bornmüller in Verh. Zool.-Bot. Ges. lx. 147 (1910) makes the combination *Lagoseris obovata*, but it seems quite clear that the generic name *Pterotheca* must stand.

Campanula propinqua *Fisch. et Mey.* var. **parviflora** *Turrill*, var. nov. ; floribus minoribus distinguitur.

Herba annua, caulibus dichotome ramosis vel ramosissimis patule striguloso-hispidis usque ad 1 dm. altis. *Folia* oblonga vel elliptico-oblonga, apice subacuta, basi leviter angustata, 1-1.5 cm.

longa, 4-5 mm. lata, pagina utraque striguloso-hispida, trinervia, integra, sessilia vel fere sessilia. Flores parvi, numerosissimi, in dichotomiis terminalibusque dispositi, breviter pedicellati. Calyx strigosus, laciniis lanceolatis floriferis 4 mm. longis erectis, appendicibus triangularibus acutis 1-2 mm. longis. Corolla circiter 8 mm. longa, extus hirta.

N. Persia : Yam, Dik Dash, north-west of Tabriz, Aug. 1928, *Gilliat-Smith* 2465.

At first glance the specimen on which this new variety is based looks very different from authenticated material of the species as described by Fischer et Meyer. Comparison of the characters of all the organs (capsules excepted) has, however, failed to reveal any structural differences. The very numerous small flowers give a peculiar facies to the type specimen of the var. *parviflora*, but in another specimen (Yam, 24.6.28, Nr. 2340) received from Gilliat-Smith the flowers are slightly larger and form a partial link to specimens of the species in Herb. Kew.

***Convolvulus commutatus* Boiss.**

N. Persia : east of Lake Urmia, May 1926, *Gilliat-Smith* 1594. Hills N. of Tabriz, 15th May 1927, *Gilliat-Smith* 2062 (forma depauperata caulibus brevioribus, inflorescentiis 2-3-floris, calycis brevioribus quam in planta vulgari).

The second specimen quoted above has puzzled me considerably. In some characters it resembles *C. shirazianus* Boiss., which may be no more than a variety or form of *C. commutatus*. Bornmüller [in Beih. Bot. Centrbl. Bd. xxxiii. 2, 169 (1915)] briefly describes a f. *suffrutescens* of *C. commutatus* and has since [in Mitt. Thur. Bot. Ver. xxxvii. 53 (1927)] raised it to the rank of a species under the name *C. chamaerhacos* Bornm. The specimen of Th. Strauss on which the species is based is from near the village of Besri, in the southern part (Kuh-i-Besri) of the Kuh-i-Schahsinde to the west by north of Sultanabad (see map in Peterm. Mitt. 1905, t. 21). The characters given in the description are those of our plant except that the calyx is longer (c. 1.1 cm.) in the latter. Certainly the species, if such it be, seems much nearer to *C. commutatus* than to *C. oxysepalus* with which it is especially compared.

***Heliotropium dolosum* De Not. Rep. fl. lig. 319 (1844-48?).**

N. Persia : near Tabriz, Sept. 1925, *Gilliat-Smith* 1308 ; weed in garden, Tabriz, 1927, *Gilliat-Smith* 2126.

***Heliotropium ellipticum* Ledeb. in Eichw. Casp.-cauc. 10, t. iv. (1831-33).**

N. Persia : hills south of Tabriz, 11th June 1927, *Gilliat-Smith* 2060 ; near Tabriz, 1927, *Gilliat-Smith* 2127.

The names used above require some explanation. It is doubtful whether one or two species are represented. Seeds have been collected and it is hoped that cultural experiments at Kew will

throw more light on this problem. At present the matter stands as follows.

In Salt's Travels in Abyssinia, Appendix lxiii. (sphalm. lxii.), on the authority of Robert Brown the name *Heliotropium ellipticum* is listed but is only a *nomen nudum*. I have failed to find that it was ever attached to a description and the name is not mentioned in The Flora of Tropical Africa. It follows on the basis of the Vienna Rules that the name can be used for another plant.

In Eichwald's Plantarum novarum vel minus cognitarum quas in itinere Caspio-Caucasico observavit, with the dates 1831-33 on the title page, at page 6, the name *Heliotropium ellipticum* Led. is used and at page 10 (in another pagination) a Latin description is provided and the plant is figured with dissections at tab. iv. The habitat is given as "in orientali littore caspii maris, prope Krasnowodsk." The description and figure, so far as they go, agree with the two sheets (2060, 2127) of Gilliat-Smith's quoted above.

In 1840 Steudel in his Nomencl. i. 744 introduces the name *H. eichwaldii* as a substitute for *H. ellipticum* Ledeb. non R. Brown. As we have seen above this is not now considered necessary. De Notaris, in his Repert. Florae Ligusticae 318 (1844-1848), published with a description his *Heliotropium dolosum* with the type "in litore Liguriaee occiduae prope il Ceriale legit hortulanus H. R. Bot. genuensis." Unfortunately I have not seen either a type or a specimen from the classic locality, but judging from the description (which on modern standards is decidedly imperfect) and from the numerous specimens from the Balkan Peninsula referred by various authorities, as I think correctly, to this species, I consider the two Tabriz plants (1308, 2126) quoted above must be named *H. dolosum*. They differ, so far as can be ascertained from other specimens of the species at Kew, only in the somewhat thinner texture and less dense indumentum of the leaves. These may be merely fluctuating characters modified by habitat conditions (as garden weeds?).

Boissier [in the Flora Orientalis iv. 131 (1879)] unites the two species, here kept distinct, under the name *H. eichwaldii* Steud., referring also to DC. Prodr. ix. 535 (1845). Kuznetsoff and Popoff in Flora Cauc. crit. xxxvii. 88 (1913) use the name *H. ellipticum* Ledeb., but how far they include the South European and Oriental material it is difficult to say. The name *H. dolosum* does not appear in their synonymy or in the discussion, yet the geographical distribution given includes the range of what are here considered the two species *H. dolosum* and *H. ellipticum*.

Halácsy, Consp. Fl. Gr. ii. 317 (1902), retains the name *H. dolosum* for the Greek specimens, quoting *H. eichwaldii* as a synonym from Boiss. non Steud. and *H. ellipticum* Nym. Consp. 508, quoad pl. graecam, non Led. Bornmüller, in Bot. Centrbl. Beih. xx. ii. 182 (1906), uses the name *H. dolosum* for a plant from Sultanabad, in incultis, with the remark "H. Eichwaldii Boiss. fl. Or. iv. 131" non (?) Steudel. With Halácsy and Bornmüller I am at present in

agreement, but it is obvious that more extensive field and cultural studies are essential before the questions here raised can be settled. For the time being I separate the two species as follows :

ellipticum : leaves broadly elliptic or elliptic-ovate rounded at the base, calyx as long as the tube of the corolla at the flowering stage, style minutely hispidulous.

dolosum : leaves long-elliptic with a gradually tapering base, calyx slightly shorter than the tube of the corolla at the flowering stage, style distinctly hispid or hirsute.

Cynoglossum montanum L. subsp. **extraeuropaeum** Brand var. **asiaticum** Brand in Cyprus.

The only species of *Cynoglossum* recorded by Holmboe [Studies on the Vegetation of Cyprus, 147 (1914)] from Cyprus is *C. pictum* Ait. (more correctly *C. creticum* Mill.). Three sheets of specimens in Herb. Kew, collected by Sintenis et Rigo, in monte Troodos, 18.6.1880, Nr. 828, are, however, *Cynoglossum montanum* L., although on the label the name given is '*Paracaryum myosotoides* Schrk.' After a prolonged attempt I have been unable to separate specifically *C. montanum* L. sensu Brand from *C. nebrodense* Guss. The supposed differential characters given by Brand do not hold for the Kew material. I can find no constant differences between the height of the fornicies relative to the sinuses of the corolla lobes nor between the lengths of the fruiting pedicels relative to the calyx. On the question of *C. montanum* L. non Lam. the reader is referred to Lacaita in Bull. Ort. Bot. Nap. iii. 290 (1913). It should be noticed that the same number of Sintenis et Rigo (Nr. 828) is quoted by Brand [Pflanzenr. iv. 252, 63 (1921)] as *Mattiastrum lithospermifolium* (Lam.) Brand.

Mattiastrum Aucheri (A.DC.) Brand in Samos.

Brand, in Engler's Pflanzenr. iv. 252, 70 (1921), describes a new variety of *Rindera graeca* Boiss. et Heldr. as var. *incana*. The specimens quoted for this variety are Samos : auf dem Berge Ambelos (*Forsyth Major* n. 410 ; Herb. Boiss.) ; Mykale (*Forsyth Major* n. 665). A sheet of the former number is at Kew and is written up as *Mattia graeca* (Boiss. et Heldr.) A.DC. It is certainly not this species, which has smooth plane faces to the nutlets, but has been found to agree with *Mattiastrum Aucheri* (A.DC.) Brand in Fedde Repert. xiv. 150 (1915). A comparison of all parts of the plant with the sheet of Aucher-Eloy 2285 at Kew has failed to reveal any structural differences. The type of *M. Aucheri* came from "Caria, circa hodiernam urbem Moglah," and the geographical extension to Samos is, therefore, not great.

Bilegnum medium Turrill, sp. nov. ; a *B. bungei* (Boiss.) Brand corymbo multifloro, corollis majoribus, fornicibus longioribus tubi parti mediae affixis recedit.

Herba erecta, incano-lanata, caulibus usque ad 2.7 cm. longis simplicibus teretibus. *Folia caulina* inferiore anguste linearia,

3 cm. longa, 1-1.5 mm. lata, media linearia, acuta, sessilia, basi vix attenuata, 4-5 cm. longa, 2.5 mm. lata, uninervia, integra, pagina utraque pilis longis simplicibus adpressis vel leviter subpatentibus densissime instructa, superiora breviora lanceolato-linearia. *Circinni* in corymbum terminalem laxum multiflorum (30-60-florum) dispositi, pedicellis floriferis circiter 5 mm. longis, fructiferis 1.2 cm. longis. *Calyx* plus minusve usque ad basin partitus, lobis linearivel lanceolato-oblongis subobtusis 6 mm. longis 1-2 mm. latis externe albo-villosis. *Corolla* cylindrica, 7-8 mm. longa, lobis late ovato-oblongis 1-1.5 mm. longis, fornicibus triangularibus 1.25 mm. longis tubi parti mediae affixis. *Filamenta* corollam duplo superantia. *Stylus* 9 mm. longus, glaber. *Nuculae* cum stylo cohaerentes, laeves, scaphiformes, margine duplici praeditae; margo interior grosse dentatus, exterior irregulariter dentatus vel subintegerr.

N. Persia: Urmia district, May 1926, *Gilliat-Smith* 1542.

This very interesting plant is the second species of the genus to be described. *Mattia bungei*, described by Boissier in the *Flora Orientalis* iv. 274 (1875) has been a taxonomically much-disputed species considering that only type gatherings are known. Gürke in Engler und Prantl, *Pflanzenfam.* iv. 3. a. 106 (1893) relegated it to the genus *Rindera*. Kuznetsoff, in *Trav. Mus. Bot. Acad. Imp. Sci. St. Petersburg.* vii. 35 (1910), follows Gürke by placing the species in *Rindera*, Sect. *Mattia*. Lastly A. Brand, in *Fedde Repert.* xiii. 549 (1915) and in Engler's *Pflanzenr.* iv. 252, 54 (1921), created a new genus, *Bilegnum*, for this one species. The type of *Bilegnum* was collected, according to Boissier "in montibus Persiae bor-orientalis prope Schahrud" and Kuznetsoff repeats this locality. Brand quotes "bei Deh-Malloh 27.5.1858 (Bunge)" and this agrees with the only specimen at Kew. I have not traced a Deh-Malloh in the Schahrud district.

The double margin to the nutlets is the characteristic feature of the genus *Bilegnum* and is equally well seen in *B. bungei* and in the new species here described. Accepting on this basis the genus as distinct from *Rindera* and *Mattia* (whether regarded as two genera or as one genus) the new species necessitates some revision of Brand's generic description. It is now obvious that Brand has included what are merely specific characters in this. The emended generic description must now run as follows:—

Calyx fere ad basin partitus. *Corolla* cylindrica, lobis brevibus. *Fornices* inferiori vel mediae parti tubi affixi. *Filamenta* corollam duplo superantia. *Nuculae* cum stylo cohaerentes, laeves, scaphiformes, margine duplici praeditae; margo interior grosse dentatus; margo exterior integer vel irregulariter dentatus; margo interior supra discum, exterior supra interiorem introflexus.

Herbae foliis lineari-lanceolatis vel linearibus, circinnis corymbosis.

Onosma petiolatum Turrill, sp. nov.; ab *O. pachypodo* Boiss. foliis superioribus basi gradatim angustatis inferioribus distincte petiolatis calycis segmentis angustioribus acuminatis distinguitur.

Herba perennis; radix lignosa. *Caules* erecti, teretibus, basi suffrutescentes, pilis simplicibus brevibus adpressis e tuberculo parvo ortis instructi, usque ad 2.6 dm. alti, basi circiter 4 mm. diametro. *Folia* caulina anguste elliptica vel oblanceolato-elliptica, apice attenuato-acuta, basi gradatim angustata, inferiora distincte angustato-petiolata, usque ad 7 cm. longa, 2.2 cm. lata, pagina utraque pilis adpressissimis e tuberculo parvo glabro ortis pubeque minima adpressa dense praedita; folia radicalia multo minora, plus minusve apice obtusa. *Inflorescentia* 6-8-flora; bracteae inferiores lanceolatae, gradatim acuminatae, superiores setaceae; pedicelli, incrassati, 1-2 mm. longi. *Calyx* in lacinias lineares acuminatis interdum leviter inaequales 1.6 cm. longas dense adpresso-sericeas quinquepartitus. *Corolla* clavato-cylindrica, 2.7 cm. longa, 5 mm. diametro, extus velutina, lobis late ovatis 2 mm. longis. *Antherae* 9 mm. longae, inclusae; filamenta circiter 2 mm. longa. *Stylus* 3 cm. longus. *Nuculae* ovoideae, 6 mm. longae, acutae, laeves, nitentes.

N. Persia: Yam, 19th July 1928, Gilliat-Smith 2435.

This plant is undoubtedly very closely related to *O. pachypodum* Boiss. and may, with the advent of more collections, prove to be no more than a variety of it. The distinctly petioled lower leaves give the specimens an appearance different from that of the two sheets of *O. pachypodum* at Kew. Boissier, in *Flor. Orient.* iv. 187 (1879), describes the nutlets of *O. pachypodum* as "obsolete scrobiculatis." It is somewhat difficult to interpret this phrase, but the nutlets of our plant are smooth and shining with a few very indistinct marks in the lower part. It may be noted that Grossheim [Beih. Bot. Centrbl. xlv. 232 (1827)] records *O. pachypodum* Boiss. from "in jugo Meshau-dagh prope st. viae ferr. Jam, 2100-2200 m., in calcareis Fl. Fr. 20. vi," and his plant may be the same as ours. *O. pachypodum* was originally described from Murch Mahal, Elbrus (Kotschy 158).

Bellevalia tabriziana Turrill, sp. nov.; a *B. decolorante* Bornm. foliis multo angustioribus, a *B. micrantha* Boiss. floribus breviter pedicellatis haud sessilibus praecipue distinguitur.

Bulbus elongato-ovatus, 3 cm. longus, 1.3 cm. diametro. *Folia* 3-4 anguste linearia, usque ad 1.5 dm. longa, 2-2.5 mm. lata, obtusiuscula, glaberrima, haud ciliata, in parte superiore recurvata, scapo multo longiora. *Scapus* solitarius, ad 1 dm. longus; racemus ovato-cylindricus, 5-12-florus, sub anthesi 1.5-2 cm. longus et 0.75-1 cm. latus, glaber, rhachide amoene purpureo-tincta, bracteis 1-1.5 mm. longis crassis, pedicellis 1-1.5 mm. longis, floribus suberecto-patentibus. *Perigonium* tubuloso-campanulatum, 6 mm. longum, roseo- vel caeruleo-purpureum segmentis ovatis vix 2 mm. longis et 2.5 mm. latis vix patentibus nervo uno conspicuo instructis. *Filamenta* medio tubo adnata, inferne connata, parte superiore

libera triangulari 1.25 mm. longa ; antherae atrovioleae, cordato-ovatae, 1.5 mm. longae. Ovarium elongato-ovoideum, 3 mm. altum, vix 2 mm. diametro, minutissime papillosum, stylo 1.5 mm. longo.

N. Persia : hills north of Tabriz, 10th April 1927, *Gilliat-Smith* 1775 (nomenclatural type) ; hills north and south of Tabriz, 16th April 1928, *Gilliat-Smith* 2211.

Bellevalia is considered by many authors at most as only a section of *Hyacinthus*. By those who wish to sink our species in the latter genus the name *H. tabrizianus* Turrill can be used. If *Bellevalia* be retained in the sense of Boissier, *Flora Orientalis* v. 300 (1884), the species here described is to be placed in the section *Hyacinthella* near to *B. micrantha* Boiss. *Diagn. Ser. i. v. 63* (1844) which is known from Bithynia and Northern Anatolia, and, as the var. *puberula* Hausskn. et Bornm., from Amasia. *B. tabriziana* is also morphologically similar (*e descriptione*) to *B. decolorans* Bornm. *Beih. Bot. Centrbl. xxiv. 2. 109* (1908) from Mt. Kuh-Sefid, Kermanschah district, Luristan. This, however, is said to have linear-lanceolate leaves 6 mm. broad.

XXXIX.—THE BOTANICAL NAME OF SHRUB YELLOW-ROOT. T. A. SPRAGUE.

The aberrant North American ranunculaceous plant known by the vernacular name "Shrub Yellow-root" appears in North American floras and other botanical works—e.g. Gray's *New Man. Bot.* ed. 7 (1908), Britton and Brown, *Ill. Fl.* ed. 2 (1913), Bailey, *Man. Cult. Pl.* (1924), and Rehder, *Man. Cult. Trees and Shrubs* (1927)—under the name *Zanthorhiza apiifolia* L'Hérit. " (1784)". Nevertheless its correct scientific name under International Rules and American Code is *Xanthorhiza simplicissima* Marsh. (1785).

The mistake arose as follows : L'Héritier's *Stirpes Novae*, in which the name *Zanthorhiza apiifolia* appeared, bears the date 1784 on the title-page. That date was apparently accepted without further investigation by Pfeiffer, *Nomenclator Botanicus* (1874), Dalla Torre et Harms, *Gen. Siphonog.* (1901), and others. Examination of L'Héritier's *Stirpes Novae*, however, shows that it contains 7 Fasciculi, the title page of the fourth Fasciculus, in which *Zanthorhiza apiifolia* L'Hérit. appeared, bearing the date 1785. But even that is incorrect. As pointed out by Britten and Woodward (*Journ. Bot.* 1905, 267), "one of the chief peculiarities of L'Héritier's publications is that, although they were prepared at the time indicated, none of them appeared at the date printed on the title-page." According to the very careful investigations of those writers, Fasciculus 4, containing pp. xi, xii, 63-102, tt. xxxi-xlviii, was issued in March, 1788. Hence the generic name *Zanthorhiza* L'Hérit. is antedated by *Xanthorhiza* Marsh., and the binominal *Z. apiifolia* L'Hérit. by *X. simplicissima* Marsh.

Xanthorhiza Marsh. Arbust. 167 (1785); Schreb. Gen. 727 (1791), as "*Xanthorrhiza*"; Torr. Fl. U.S. i. 333 (1824); Torr. and Gray, Fl. N. Am. i. 40 (1838), as "*Xanthorhiza*"; Endl. Gen. 850, n. 4803 (1839); Benth. et Hook. f. Gen. Pl. i. 9 (1862); Engl. & Prantl, Nat. Pflanzenfam. iii. Abt. 2, 58 (1888), as "*Xanthorrhiza*"; Post et Kuntze, Lexic. Gen. Phan. 596 (1903).

Xanthorhiza L'Hérit. Stirp. Nov. fasc. 4, 79, t. xxxviii (1788); Juss. Gen. 234 (1789); Willd. Sp. Pl. i. 1568 (1798); DC. Syst. i. 386 (1818); Robins. and Fernald in Gray's New Man. Bot. ed. 7, 408 (1908); Britton and Brown, Ill. Fl. ed. 2, ii. 89 (1913), as "*Xanthorrhiza*"; Bailey, Man. Cult. Pl. 280 (1924); Rehder, Man. Cult. Trees and Shrubs, 215 (1927).

Xanthorhiza simplicissima Marsh. l.c. (1785).

Xanthorhiza apiifolia L'Hérit. l.c. (1788); Torr. l.c. (as "*Xanthorhiza apiifolia*"); Torr. and Gray, l.c.; Robins. and Fernald, l.c.; Britton and Brown, l.c. (as "*Xanthorrhiza apiifolia*"); Bailey, l.c.; Rehder, l.c.

The early authors who adopted the generic name *Xanthorhiza* Marsh. in preference to *Zanthorhiza* L'Hérit. seem to have done so purely on philological grounds, and not for reasons of priority. They rejected the specific epithet *simplicissima*, proposed by Marshall, in favour of *apiifolia* L'Hérit., probably because the latter epithet seemed more suitable. Marshall of course called the plant *simplicissima* because the stems are "generally simple, or without branches."

It may not be amiss to draw attention to the series of Bibliographical Notes published in the "Journal of Botany." An index of those which appeared during the years 1893-1924 was given in Journ. Bot. 1926, 274. Many of them contain valuable information as to dates of publication inaccessible elsewhere. They do not seem to have been fully utilized, judging from the cases of *Xanthorhiza* and *Engelmannia* (vide *Kew. Bull.* 1929, 82).

XL.—MISCELLANEOUS NOTES.

GIACOMO BRESADOLA.—It is with regret that we learn of the death, on June 9th last, of the Abbé G. Bresadola of Trento, in his 82nd year.

Bresadola was perhaps the most outstanding figure among modern mycologists, remarkable both for the thoroughness of his knowledge of fungi, especially Basidiomycetes, and also for the universal esteem and affection in which he was held. It would be difficult to estimate how many of the succeeding generations of systematic mycologists have owed their first guidance in difficult groups of Hymenomycetes to his unfailing helpfulness and courtesy. Perhaps that which endeared him most to his correspondents was his modesty, shown in the simple statement, when he was unable to find a name for a species, "*à moi inconnue.*"

His early studies were on the fungi to be found round Trento, and he tells us in the preface to his first work that he received much friendly assistance from Dr. Quélet. This first work (*Fungi Tridentini novi, vel nondum delineati*), published in 1881 and consisting of two volumes, at once stamped its author as a mycologist of the first rank. It contains 217 coloured plates of great merit, prepared by Bresadola himself, and accompanied by very careful and accurate descriptions and critical notes.

His subsequent work is marked by the same thoroughness. He attempted no new classification, but his knowledge of species and genera of the higher fungi was unrivalled, and his opinion recognised everywhere as authoritative. In common with Patouillard, Bresadola developed especially the use of microscopic characters for purposes of identification, and to him we owe the foundations of present-day knowledge of such difficult groups as Thelephoraceae and Hydnaceae.

In addition to his knowledge of European fungi, he became also, especially in his later years, an authority on the Hymenomycetes, notably the Polyporaceae, of tropical regions. This knowledge was gained by a painstaking study of the type specimens of older authors, of which all the chief herbaria of Europe show evidence in his notes attached to the sheets. He was for some years an active correspondent of Kew, and in return for facilities for study enriched the Herbarium with many valuable specimens of his own determination.

In three of his latest papers he published in connected form lists of synonyms which he had compiled from this study of the types preserved in various collections.

Two years ago, on the occasion of his 80th birthday, as a testimonial from mycologists all over the world, the Società Botanica Italiana, in conjunction with the Museum of Natural History of Trento, invited subscriptions towards publishing Bresadola's collection of water-colour drawings of fungi. Already nine volumes of the "*Iconographia Mycologica*" have appeared, and it is very satisfactory to learn that the materials for its completion are in the hands of Professor Traverso, and that the work will suffer no delay or curtailment on account of the passing of its eminent author. When completed it is estimated to consist of twenty volumes, each with fifty coloured plates and accompanying text, a fitting memorial to a great mycologist.

E. M. W.

Botanical Expeditions: British Guiana.—With the aid of funds placed at the disposal of the Ministry of Agriculture and Fisheries for the purpose of affording assistance to the Colonies in the investigation of their local floras, it has been possible for Mr. N. Y. Sandwith, a member of the Herbarium staff at Kew, to be attached to the Oxford University Expedition to British Guiana. Mr. Sandwith has been working for some time on the British Guiana collections in the Kew Herbarium, with a view to the preparation of

a Flora of the Colony. The opportunity to study the vegetation on the spot and to make extensive collections in the little-known hinterland will greatly facilitate the preparation of the Flora when the work is undertaken.

The Expedition is under the leadership of Major R. W. G. Hingston, M.C., who was medical officer and naturalist to the third Mount Everest Expedition, and who was second in command of the Oxford University Expedition to Greenland last year. It will have its base in a locality north of the Essequibo, and will operate mainly in the rain-forest region. Part of the Expedition will return in two months, but arrangements have been made for Mr. Sandwith to remain in British Guiana for the full period of four months.

Somaliland.—An opportunity for the study in the field of tropical vegetation of an entirely dissimilar type has been afforded by the British-Italian Somaliland Boundary Commission. The following invitation to attach a Botanist to the Commission has been received from the Secretary of State for the Colonies :—

Colonial Office,
Downing Street.
4th June, 1929.

38III/29.

Sir,

I am directed by Mr. Secretary Amery to inform you that arrangements are being made for the demarcation of the boundary between British Somaliland and Italian Somaliland, as defined by the Anglo-Italian Protocol of the 5th May, 1894. It is proposed that the Joint British and Italian Boundary Commission should begin work on the boundary (at Bandar Zaida on the coast) on the 1st September next. The scope of the Commission's work is indicated in the enclosed instructions to be issued to it [not printed], in which the Italian Government have concurred. The British section of the Commission is now being selected and will consist of three military officers, three or four non-commissioned officers, a Royal Army Medical Corps officer, a civil Political Officer and probably a geologist.

2. Mr. Amery has directed that the above information should be conveyed to you, as it has been suggested to him that you might wish to consider the possibility of sending a qualified botanist, or other specialist from Kew to accompany the Commission. Mr. Amery fears that it would not be possible to include any of the expenses involved by the visit of such an expert among those chargeable to the Commission's account; but he would gladly make arrangements, should you desire it, for any one whom you may care to nominate to be attached to the Commission, and to be given every facility to carry out his work in the areas to be surveyed.

3. Should you desire any further information as to the Commission's work or as to the terrain in which this is to be carried out, Mr. Amery will make arrangements for you to be put into touch with the officer of the Royal Engineers who is to act as Senior British

Commissioner, and also with a Somaliland officer who has been stationed near the boundary concerned.

I am, Sir,

Your most obedient Servant,

(Signed) J. FREDERICK N. GREEN.

The Director,
Royal Botanic Gardens,
Kew, Surrey.

As the country to be traversed is botanically *terra incognita*, the invitation was gladly accepted, with the concurrence of the Ministry of Agriculture and Fisheries and the Empire Marketing Board. Kew has been fortunate in securing the services of Mr. C. L. Collenette, a naturalist with much experience of collecting in Africa and elsewhere. Every facility is being afforded Mr. Collenette by the Colonial Office and the Foreign Office. The Commission is expected to be in the field for about six months.

A Gift of Cacti.—At the Royal Horticultural Society's Show at Chelsea in May, 1929, an outstanding display was the exhibit of Cacti and other succulent plants, shown by Mrs. A. Sherman Hoyt, of Pasadena, California. The valuable collection, comprising about 150 plants, together with a large quantity of the natural stone and sand, was transported from California to London with such success that not a single plant suffered injury.

At the close of the Show Mrs. Hoyt most generously presented the collection to Kew, and the plants are now installed in the Succulent House. A portion of the bed at the north end of the house has been cleared for their reception; and the native stone and sand have been utilised in giving the plants as natural a setting as possible. This arrangement preserves its general interest, and, at the same time, demonstrates its educational value.

Among so many magnificent plants several are new additions to the Kew collection. The following are particularly noticeable on account of their size and grotesque appearance. *Ferocactus Lecontei* Britton & Rose is represented by three large specimens, each with a stem over 3 feet high and 18 inches in diameter, covered with a thick network of stout spines of a reddish colour. In smaller plants the spines are a brilliant red. *Echinocactus polycephalus* Engelm. & Bigelow, of which there are several fine specimens, is remarkable in having from 6 to 15 stems which spring from the same base. The stems are from 15 to 18 inches high and 10 or 12 inches in diameter, and are covered with exceptionally stiff spines.

Echinocereus Engelmannii Rümpler is a very distinct species with great numbers of long, straight, crowded spines which completely hide the stem and look like a stiff bottle-brush. Amongst the several plants of this species there are three distinct varieties, differing chiefly in the colour of their spines. The largest specimen consists of 30 stems and is over a yard wide.

A very handsome plant is an unnamed *Opuntia* which may be *O. strigil* Engelm., a rare plant in cultivation. It is 4 feet high and well branched, the joints being covered with numerous long yellow spines. Another well marked and pretty species is *Opuntia Davisii* Engelm. & Bigelow, with slender joints and long yellow spines. A very singular plant, which does not belong to the Cactus family, is *Fouquieria splendens* Engelm. This shrub produces long, slender, prickly branches from the base which reach a height of 8 feet. The bright red flowers are borne at the tips of the branches. It is reputed to make an effective and almost impenetrable hedge.

Other genera are represented by several species of *Cereus*, *Mammillaria*, *Agave* and *Yucca*.

This gift is greatly appreciated, and visitors to Kew have expressed the greatest interest in Mrs. Hoyt's unique collection of desert plants which she has so generously presented.

Sterculia from Fiji.—In a collection of plants sent from Fiji by Mr. William Greenwood a species of *Sterculia* is present which, though well-known as a Fijian plant, requires a new name.

A. Gray in U.S. Explor. Exped. p. 185, t. 13. (1854), originally described the plant as *Firmiana diversifolia* collected in Fiji. In 1865 Seemann, in *Flora Vitiensis* p. 23, transferred it to the genus *Sterculia*, making the combination *Sterculia diversifolia* (Gray) Seem., apparently oblivious of the fact that in 1830 G. Don had already given this name to a distinct species found in Australia. As the name is preoccupied Mr. Greenwood proposes to call it ***Sterculia Guppyi Greenwood***.

Flora of the Upper Gangetic Plain.—After a lapse of nine years since the publication of the last part, part 3 of vol. iii of the above named Flora, left incomplete at the death of Mr. J. F. Duthie in 1922, has been published. The present part includes the nine families *Palmae*, *Pandaneae*, *Typhaceae*, *Aroideae*, *Lemnaceae*, *Alismaceae*, *Naidaceae*, *Eriocaulaceae* and *Cyperaceae*. The first six had been completed by Mr. Duthie, and the rest, with the exception of about one-third of the *Cyperaceae* prepared by Dr. W. B. Turrill of Kew, have been dealt with by Mr. R. N. Parker, of the Indian Forest Service and Forest Botanist to the Government of India. It is uniform with the previous parts in every particular.

The completion of the Flora will be welcome and it is a matter for congratulation that a competent botanist has been found to carry out this much needed task. It is to be hoped that the concluding part will find room for a good general index, a survey of the flora of the region concerned as a whole, and for a supplementary list, with keys, to comprise the species discovered since the publication of the earlier parts.